Emergency Handling and ERDMP Compliance in Natural Gas Network

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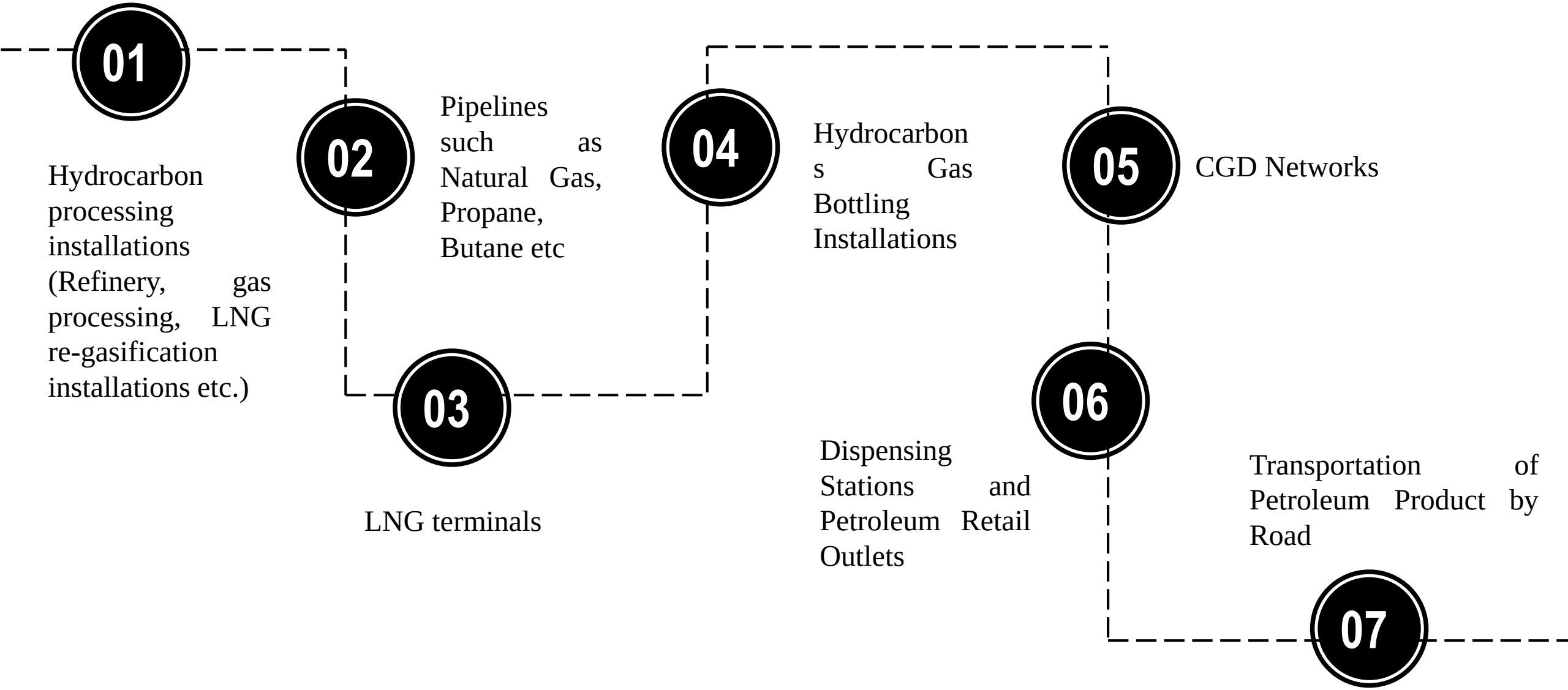
Emergency Response and Disaster Management Plan

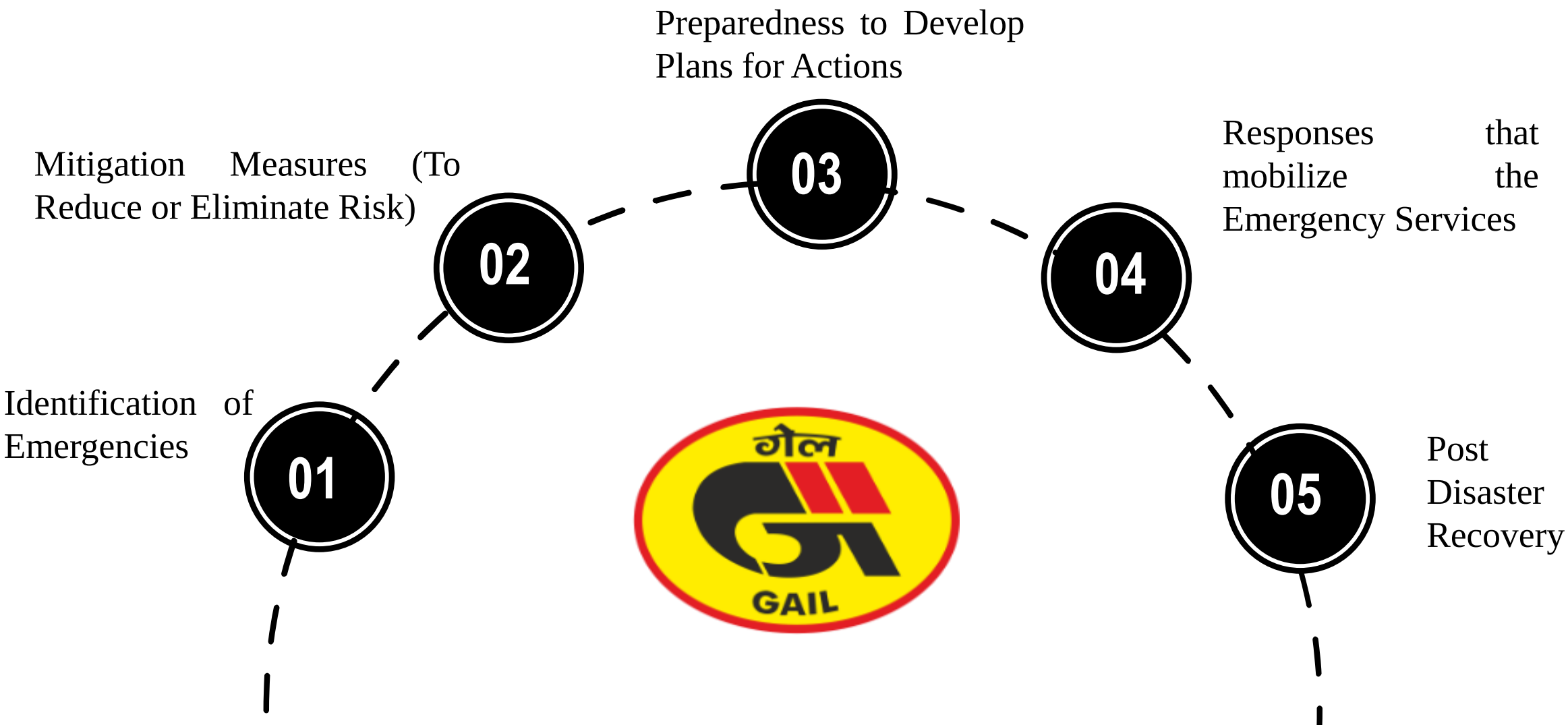
Petroleum and Natural Gas Regulatory Board (Codes of Practices for Emergency Response and Disaster Management Plan (ERDMP) Regulations, 2010 was notified on 18th January 2010.

The objective of regulations is to develop an ERDMP that should be concise and informative which provides quick reference to the action plan to determine important functions that are being carried out to manage the emergency effectively.

Applicability of ERDMP



Scope of ERDMP



Chapters of ERDMP

	Description
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3.0	Applicability
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5.0	Contents of ERDMP
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12.0	Emergency Preparedness Measures
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17.0	Resources for Controlling Emergency

	Description
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22.0	Roles & Responsibilities of Stakeholders including External Agencies
23.0	Reporting of Incident
24.0	Action after Reporting of Incident by the Entity
25.0	Termination of Emergency
26.0	Emergency Recovery Procedures
27.0	ERDMP for Pipelines carrying Petroleum Products & Retail Outlets
28.0	ERDMP Road Transportation
29.0	Integration of ERDMP with NDMP
30.0	Security Threat Plan
31.0	Miscellaneous

Classification of Emergencies

On Site Emergency

Level 1 Emergency:

- Manageable within site available resources
- No impact outside the site

Level 2 Emergency:

- Not manageable/ contained within site by available resources
- Potential to have effect beyond site location
- Mutual aid partners may be involved

Off Site Emergency

Level 3 Emergency:

- Emergency with an off-site impact
- Control under District Admin management
- Catastrophic and likely impact on human life, property and environment etc

Classification of Emergencies

Sr. No	Type of Emergency	Applicable EAP	Description of Emergency
1	Level-1	On Site	1. Minor gas leakage from the flange of PRS/Metering/Vent/filter. 2. Minor fire arising out of heavier content from filter drainage 3. Leakage from Pig Launcher / receiver. 4. Collapse of building / structure / poles etc. 5. Failure of gasket resulting in leakage. 6. Pop off of Pressure Safety valve resulting in leakage. 7. Minor gas leakage/fire through pinhole in pipeline up to 5mm. 8. Leakage/Fire of High Speed Diesel.
2	Level-2	On Site	1. Medium sized Gas Leak from above Ground pipelines (above 5mm & less than 25 mm). 2. Fire arising due to gas leakage through hole in pipeline (above 5mm & less than 25 mm). 3. Failures caused by external mechanical interference, corrosion defects, miscellaneous factors such as pipe material defects, natural hazards.
3	Level-3	Off Site	1. Agitation, Natural calamities (earthquake), terrorist activity. 2. Gas Leak from AG pipelines through full bore rupture / 20% of CSA. 3. Fire arising due to NG Leak from AG pipelines.

Hazards associated with Natural Gas Pipeline Network

- **Leaks and Explosions:** One of the most significant risks is the potential for leaks or ruptures in the pipeline
- **Fire Hazard:** In addition to explosions, leaks in natural gas pipelines can lead to fires if the gas comes into contact with a spark or flame.
- **Health Risks:** Exposure to natural gas can pose health risks to individuals, particularly if it occurs in enclosed spaces
- **Environmental Impact:** Methane, the primary component of natural gas, is a potent greenhouse gas that contributes to climate change

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Hazards associated with Natural Gas Pipeline Network

- **Corrosion and Material Failure:** Over time, natural gas pipelines can corrode or experience material failures due to factors such as age, environmental conditions, and manufacturing defects.
- **Excavation Damage:** Accidental damage to natural gas pipelines during excavation or construction activities is another significant hazard.
- **Terrorism and Sabotage:** Natural gas pipelines are potential targets for terrorism or sabotage, which could result in deliberate explosions or other acts of destruction.
- **Operational Errors:** Human error, such as improper operation, maintenance, or monitoring of pipelines, can also contribute to accidents and incidents.
- **Earthquake**
- **Snapping of pipeline due to natural calamities.**

Emergency Scenarios in Pipelines

- **Station emergency** - Shut down of individual Gas compressor station
- **Terminal emergency** - Shut down of individual Gas terminal
- **Partial emergency of P/L-** Shut down of a small section of pipeline
- **Major Emergency** - The shutdown of the entire pipeline system. All facilities along the P/L will stop its operation.

All these controls can be done remotely from either Local control Room or Regional Gas Management Center

Consequences of Emergencies

- Consequences may be confined within premises or may spill off-site.
- This can trigger off a cascading effect as well.
- The direct consequences are fire, explosion, BLEVE, toxicity, etc.
- Damage to life and property.
- Damage to Environment

Emergency Preparedness

- on-site Disaster Management Plan (DMP) - by every industry and off-site DMP - by District collector
- This is a statutory requirement under MSIHC Rules and is invariably one of the conditions of the EC given by MoE&F, GOI
- Such a plan, must inter-alia, cover the possible hazardous situations and the areas most likely to be affected within and outside the industry.
- The DMP document for chemical accidents is to be designed to provide for measures to contain the incident and for minimization of effects due to fire, explosives, release or escape of toxic gas, spillage of hazardous substance in storage, processing or during transportation.

Disaster Preparedness

Overall Objectives of the Plan

- Safeguard lives, environment and property at site and in its neighborhood.
- Contain the incident and bring it under control.
- Rescue and treat casualties.
- Evacuate workers to safe areas.
- Extend necessary welfare assistance to casualties.

Disaster Preparedness

The objectives are sought to be achieved through the following measures:

- Providing information to all concerned on the estimated consequences of the events that are likely to develop as a result of the emergency.
- Mobilizing on-site resources.
- Calling up assistance from outside agencies.
- Initiating and organizing evacuation of affected workmen.
- Collecting data on the latest developments, other information and requirements.

Training and demonstration for community awareness

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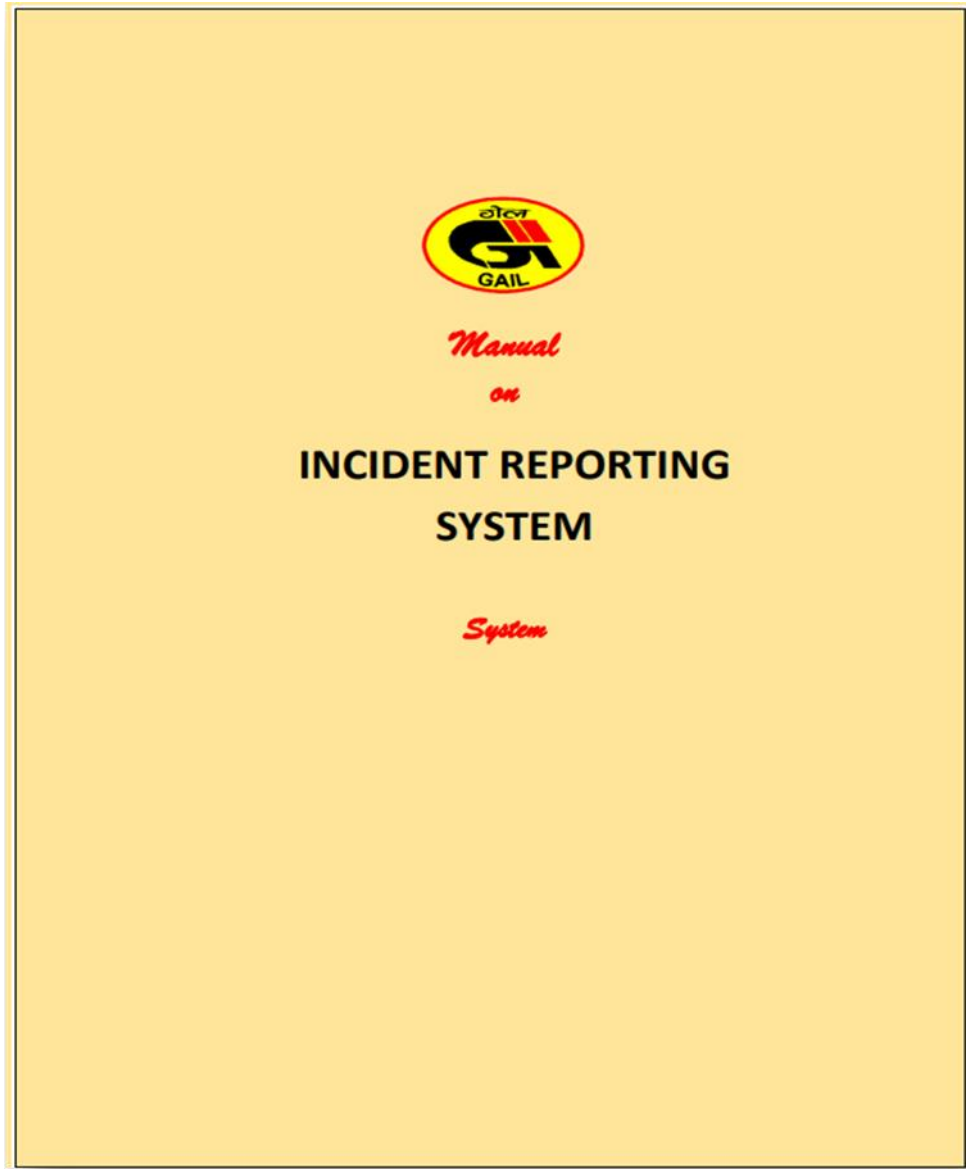
Emergency Planning and Response

Mutual Aid agreement exists with nearby Industries across GAIL installation

Offsite Mock Drill

Incident Reporting, Investigation and Analysis



Contents

ERDMP of Installations

- Emergency Response and Disaster Management Plans covering all installations Natural Gas Pipelines.
- ERDMP documents were duly verified by Third Party Inspection Agency (TPIA) in accordance with PNGRB (Emergency Response and Disaster Management Plan (ERDMP) Regulations, 2010 before accreditation.
- These ERDMP documents are duly accredited by Third Party Inspection Agency.
- All ERDMP Documents pertaining to Installations have been approved by Board of Directors.
- All ERDMP Documents, after due approval of Board are required to be submitted to Petroleum and Natural Gas Regulatory Board.

ERDMP Cycle


PRE EMERGENCY PLANNING
EMERGENCY MITIGATION SYSTEM
EMERGENCY RESPOND PREPARENESS
EMERGENCY RECOVERY

Pre Emergency Planning: Hazard Identification

Industrial Hazards

- Flash Fire
- Jet Fire
- Pool Fire
- Vapour Cloud Explosion
- BLEVE
- Toxicity

Natural Hazards

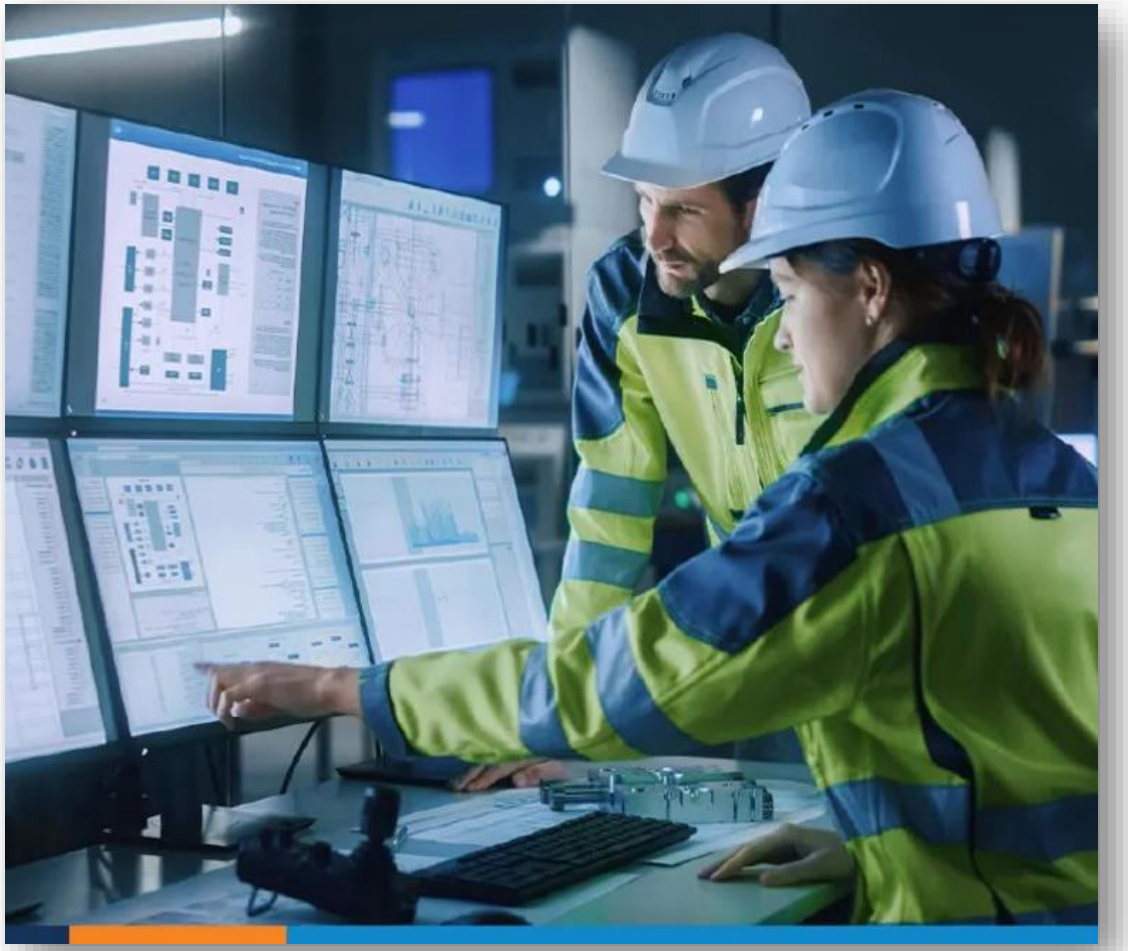
- Flood
- Earthquake
- Cyclone
- Outbreak of Disease
- Excessive

Extraneous Hazards

- Bomb Threat
- Civil Disorder
- Terrorism

Emergency Mitigation Measures

- Design, Construction, Operation & Maintenance of facilities in accordance with National & International Standards like OISD, PNGRB, IS, ASME 31.8B, API etc.
- Automatic Emergency Shutdown Interlocks
- Leak Detection System
- Supervisory Control and Data Acquisition (SCADA)
- Installation of Electrical Equipment as per Area Classification
- Installation of Remote Operated Valves at Main Line of Pipeline System



Emergency Mitigation Measures

- Provision of Early Warning System like gas monitoring system, detectors, high level alarms, low pressure & high pressure alarm etc.
- Well laid down Standard Operating Procedures
- Internal & External Safety Audit System
- Deployment of qualified and skilled manpower resources
- Work Permit System in accordance with OISD 105

Emergency Response Preparedness

Emergency Preparedness

- ✓ Emergency Mock Drills
- ✓ Communication System
- ✓ Mutual Aid Agreements
- ✓ Training
- ✓ Emergency Response Procedures
- ✓ Zones and Mapping

Emergency Organizations & Others

- ✓ Organization Chart-DMSG etc.
- ✓ Role and Responsibilities of Chief Incident Controller & Other Coordinators
- ✓ Emergency Action Plan
- ✓ Siren Code
- ✓ Emergency Control Center & Assembly Point
- ✓ Resources for Controlling Emergency
- ✓ Demographic Information
- ✓ Medical Facilities
- ✓ Evacuation & Rescue
- ✓ Information to Public

Risk Mitigation Measures

- Hazard is inevitable but reduction of risk to ALARP
  - Proper MOC & HAZOP study before set-up of any unit or modification
  - HAZOP study in every fixed interval of 05 years
  - QRA (Quantitative Risk Analysis) study in every five years through Third party through renowned software like PHAST, SAFETI, etc.
  - Through QRA, ensure all credible scenarios & their consequences are identified, modelled & risk mitigation measures are in place

Risk Mitigation Measures

Job Safety Analysis (JSA) is being carried out before start of each critical work permit activity

RRA (Rapid Risk Assessment) periodically for pipeline installations

TBT (Tool Box Talk) is given to workmen onsite before start of job

Risk Register is maintained, all Risks are identified, reviewed periodically & mitigation measures are taken for each risk

Fire envelope study through external agencies is being carried out for assessing / extent of fire proofing to critical equipment

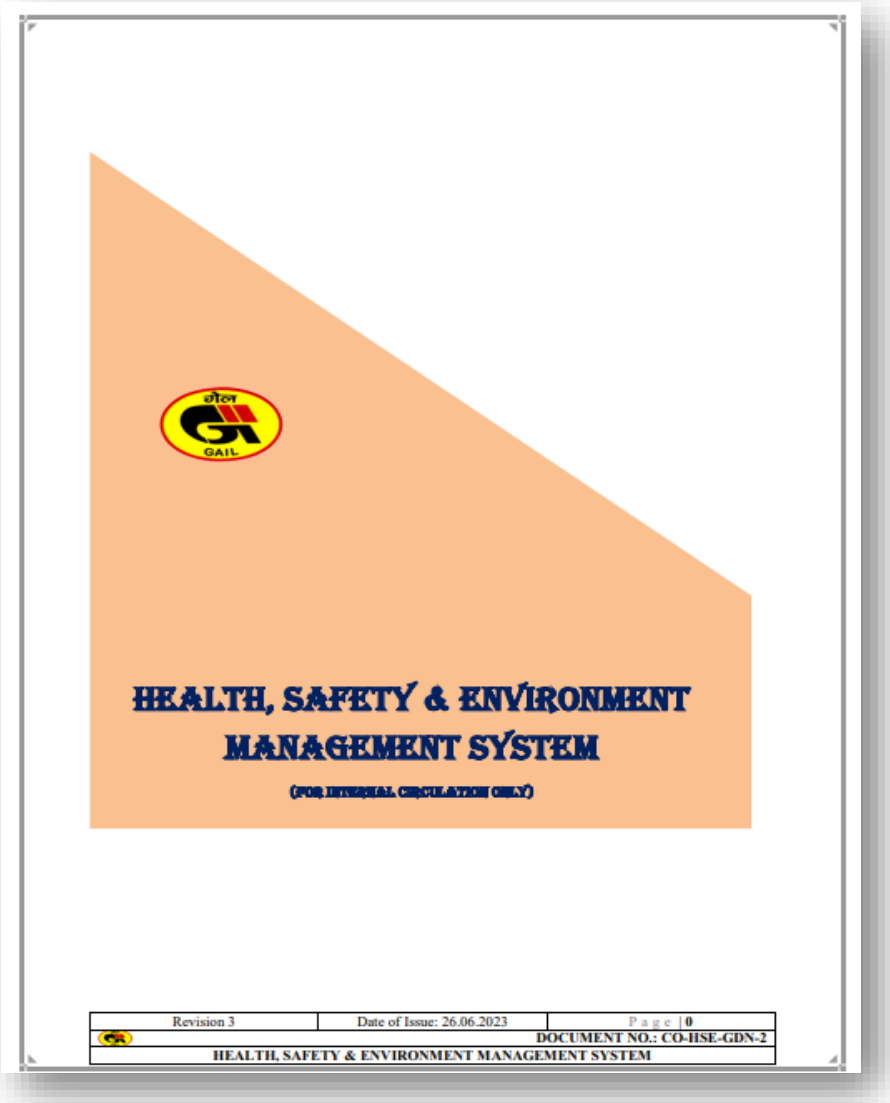
Training

- Establishment of Learning Centres to train manpower at all levels covering entire range of activities including Health, Safety and Environment.
- Committed to impart internal or external training to all employees once in a year.
- Internal HSE Training System is set up at work Centers in accordance with guidelines of OISD 154.
- Training ground for live fire fighting training on various simulations like column fire, tank fire etc. at installations.

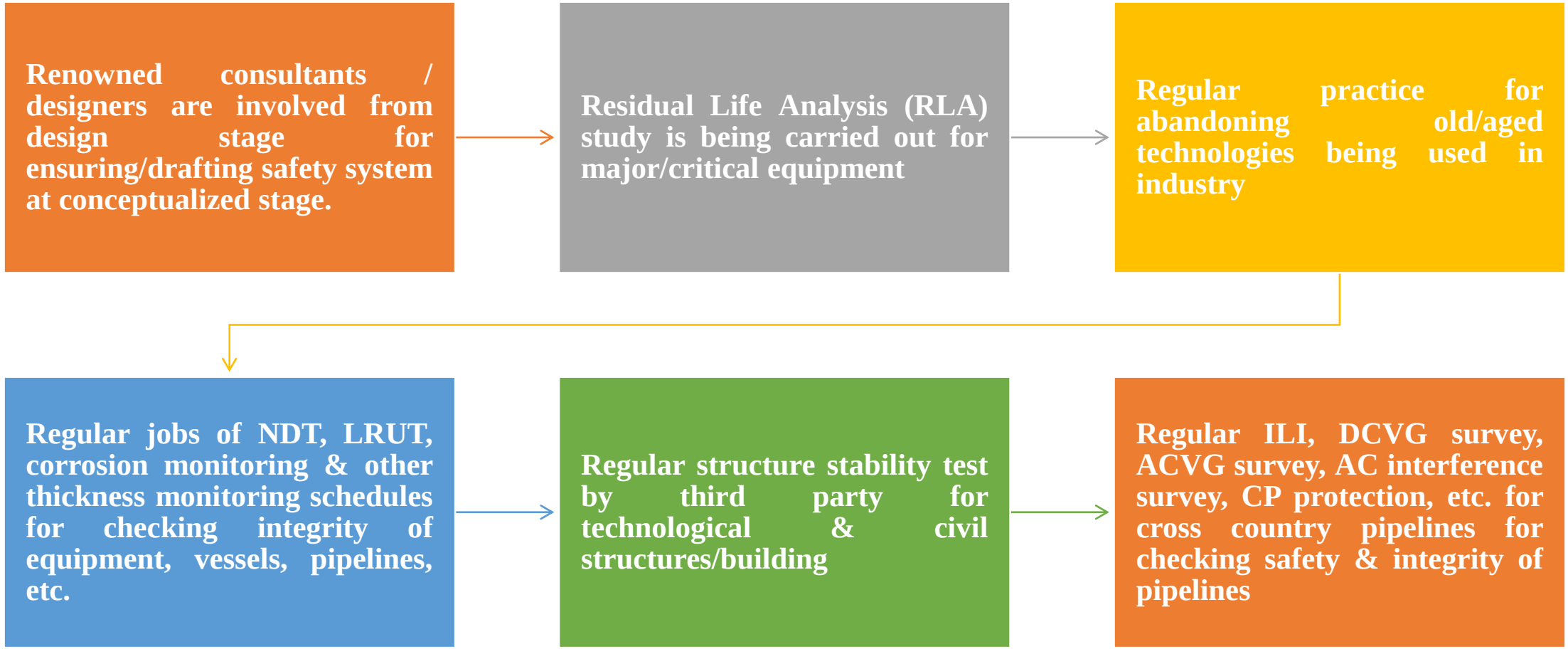
Emergency Preparedness Training

Safety Measures

1. Leadership & Commitment
2. Employee Participation
3. Facility design. Construction & pre-Start-up
4. Process Safety Information
5. Risk Analysis & Management
6. Third Party Services
7. Personnel Safety
8. Control of defeat & reliability of control systems
9. Work Permit System
10. Operation & Maintenance Procedures
11. Inspection & maintenance
12. Management of Change
13. Training
14. Incident Reporting, investigation & analysis
15. Occupational Health
16. Environmental management
17. Emergency Planning & Response
18. Compliances of Audits



Safety Measures -Process Safety & In-Built Safety



Safety Measures (Operational Safety)

- Higher level of authorization for issuing work permits for jobs in night, odd hrs, holiday, road cuttings, etc.
- Surprise SOP compliance check in field area by team
- Regular Safety rounds by top leader of site.
- Procedure of reporting unsafe acts, unsafe conditions, nearmiss through online portal & also through physical mode
- Availability of Process Safety Officers, Risk Officers & Radiological Safety Officers, trained first aiders, certified scaffolders etc.
- Procedure of safety briefing for each entrant before making permanent gate passes for work inside plant.
- Procedure of investigation of any incident, trip analysis, root cause analysis, online incident reporting.

Safety Measures(Audits / Inspections)

- Regular audits through OISD, PNGRB, T4S, DISH, CEA & other statutory authorities

- Specific & time bound audits for Buildings safety, Electrical Safety Audit, Lightening arrestors adequacy check, Environment audit, Occupational safety & health audit, self safety inspections, vulnerable areas visit, audit for work permit system

- Gap analysis study of HSE Management System by renowned external agency.

- Comprehensive Organizational HSE audit by OISD

Fire & Safety Systems & Procedures

- Fire & Safety systems are designed & installed as per OISD, NFPA, ASME, API & other National & International Standards

- Trained & qualified fire & safety personnel are available at each site round the clock to tackle any possible eventuality

- Fire appliances like Fire Tenders, Multipurpose fire tenders, Emergency Rescue Tenders, Mini multipurpose fire tenders, water mist based fire tenders, etc. for assistance in emergency handling.

Emergency Communications and Roles & Responsibilities

- Site Specific Emergency Organization is in place with defined roles and responsibilities of Chief Incident Controller, Site Incident Controller and other Coordinators .
- Emergency Action Plan chart is prepared and displayed at prominent locations of Installations.
- Site Specific Emergency Organization, Disaster/Crisis Management Sub Group has been constituted at Corporate Level
- National Gas Management Center (NGMC) is declared as Nodal Control Room for Incident Information.

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Thank You